



a place of mind

**Biochemistry and Molecular Biology
Comprehensive Examination Guidelines
2017-2018**

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Background and Exam Format

The exam is designed to test your knowledge and understanding of standard concepts in Biochemistry. Students should demonstrate an in-depth knowledge of their chosen research topic. The Comprehensive Exam is taken by all doctoral students and MSc students who are planning to transfer to the PhD without MSc completion.

Although comprehensives can be held at any time during the second academic year, most BIOC students will have the exam in March and April of their second year.

Prior to sitting the exam you must:

- Obtain permission from your Supervisory Committee to proceed with the exam
- Obtain a list of topics to be covered in the exam
- Obtain your examination committee's approval for your written research proposal

During the examination you are expected to present a clear and concise summary of your thesis proposal. You are also expected to demonstrate in-depth knowledge, imagination, practical and technical understanding, and original thinking in relationship to the proposal and in related areas. Although topics covered will vary each exam will follow the same format:

- You will give an illustrated oral presentation describing your research proposal (10-15 minutes maximum).
- This will be followed by a first round of questions from the Examiners focusing primarily on the proposal.
- A second round focusing on the additional topics agreed upon with each individual member of the Examination Committee will follow.
- You are not allowed to use any extra figures, data slides, etc. (unless specifically assigned in advance by an Examiner) made in anticipation of possible questions on these additional topics.
- The oral examination should generally not exceed 2 hours.

The comprehensive examination committee consists of the following members:

- **Excluding the thesis supervisor**, usually **2 members of the supervisory committee**
- An **external examiner**. The external examiner is normally a department member with expertise in the student's field of research.
- The **Comprehensive Exam Chair** attends each exam in order to ensure consistency and fairness.

Based upon the examination, the committee will recommend one of the following:

- You should remain in or be allowed to transfer to the PhD program.
- You should remain in or transfer to the MSc program.
- You should withdraw from the graduate program.
- You should repeat part or the entire comprehensive exam, or complete additional requirements

Deadlines and Setting up Your Exam

There are a number of tasks which should be completed leading up to the Comprehensive Exam.

Before 15 December 2017

Meet with your Supervisory Committee to **obtain approval of your PhD thesis topic**. Please provide the committee with a brief written summary of your course work, research progress, and goals. [Refer to committee forms](#). We strongly recommend that you hold this meeting after your BIOC 530 seminar presentation.

During the Committee Meeting

If you do receive permission to transfer, your **Committee should then suggest an external examiner and exam topics** (*make sure to let them know that this is expected of them before the meeting*). The goal of the topics is to ensure that you have adequate background in areas *broadly* related to your proposed research.

These topics may evolve around review articles, a series of papers, the background for a relevant technique, and so forth. *You should be present when these topics are discussed*. **Submit a signed [Form One](#)**, summarizing these topics, to the Graduate Program Coordinator who will collect on behalf of the Exam Chair.

The Committee will also suggest two or three individuals who would be appropriate external examiners. From this list, the Exam Chair will choose and invite the external examiner for your exam.

By 25 January 2018

The written proposal will be on your planned PhD research. Although aspects of the research will likely reflect the on-going work in your supervisor's laboratory, it is expected that you write and defend the proposal independently and that any data presented as "progress" be your own. **Email or deliver a copy of your thesis proposal to the 2 committee members and to the Comprehensive Exam Chair**. The chair will send a copy of your proposal to your external examiner and invite this examiner to your exam.

By 9 February 2018

Students should meet with each member of the Examination Committee to obtain **approval of the written proposal**.

If the proposal is approved please submit [Form Three](#) to the BIOC graduate secretary. If not approved then [Form Two](#) must be completed by the end of February.

By 9 February 2018

To prepare for the Comprehensive, refer to the suggested exam topics listed in the submitted [Form One](#) and [Form Three](#).

By 13 April 2018

BIOC comprehensives are held from March 15 to April 15, the Graduate Program Coordinator will schedule exams, book the rooms, and equipment. Scheduling will start as soon as external examiners are confirmed.

After the exam the Committee will write up a [report](#) describing your performance. You will be sent this report once it is completed. The Graduate Program Coordinator will send forms to G+PS to transfer you to the PHD program and/or advance you to candidacy. In most cases the program

changes will take place effect May 1 in the year of the exam.

Please note the following:

- It is the student's responsibility to meet the necessary deadlines and to obtain the required signatures.
- In the absence of an acceptable written proposal, the subsequent comprehensive exam will be cancelled and a recommendation made to the Graduate Program Committee that the student's registration in the PhD program be terminated (i.e., students will be required to remain in or transfer to the MSc program or possibly asked to withdraw from the graduate program).

Comprehensive Exam Chair and the Graduate Secretary Roles and Responsibilities

Comprehensive Exam Chair

The Chair will be appointed by the Head of Department and is usually a member of the graduate committee. It is the Chair's responsibility to ensure fairness and consistency by attending each exam.

Exam Chairs

- Review and sign off on the topics chosen by the exam committee to ensure they are neither too broad or narrow and are sufficiently different to allow full exploration of the student's knowledge of a topic.
- Can suggest changes to topics to meet the above criteria.
- Outlines the procedure to be followed at the start of the exam.
- Control the overall flow of the exam: for example they will ask the student to begin their presentation or invite each examiner to ask their questions.
- Does not vote on a student's performance.
- However they will lead and facilitate the post exam discussion with the examination committee.
- Write up the committee's observations at the end of the exam and communicates them to the student.

Graduate Program Coordinator

The Graduate Program Coordinator is responsible for ensuring the administrative aspects of the exam process are correctly completed. He/she will work with the Exam Chair to:

- Prepare a list of students who want to sit the exam
- Ensure students sitting the exam complete and hand in the necessary forms.
- Ensure all the student's research proposals are completed and approved.
- Check that each candidate has satisfied or will satisfy FOGs rules on course requirements for transfer to PhD
- Schedule all the exams.
- Book rooms and reserve the department's projector for each exam.
- Submit the [correct forms](#) to G+PS requesting students be transferred to the PhD program and/or admitted to candidacy.
- Monitor student records to ensure student's transfers are actioned

Creating the Written Proposal

Physical Limits

- The written proposal is limited to five single sided pages of single spaced text
- Use a font size **no** smaller than 12 point font.
- A margin of at least one inch is required on all sides. Use the file menu and select page up to alter the margins.
- There is no page limit on references.
- All reference citations should include titles and complete pagination.
- Additional pages of figures (with minimal legends) are permitted.

Organization and Layout

In order for a research proposal to be successful, it must be well organized. You have little space to discuss what are likely to be complex experiments. Some guidelines as to how to organize your written proposal are summarized below. Optimum approach will depend to a great extent on the type of research you propose carry out. However all proposals should have the following sections:

Abstract - One paragraph summary

What is the big question that your proposed experiments will contribute to? For example: "Can ribozymes do everything that proteins can?" Why is this an important question? Which experimental system have you chosen to investigate it in, and why? Summarize the questions you will ask and how your experiments will answer them. Where will this research lead? How does it fit into the big picture?

Background - One to two pages

Give background to the experimental system you will be using. Include a succinct review of the relevant literature. What is already known, what is hypothesized, how the hypothesis might be tested? Have new information or new techniques recently become available that can be applied to this investigation?

Objectives - One to two paragraphs

It is best if your objectives are expressed as questions or hypotheses. This will help you to see whether the experiments you propose will give the answers you need. You might have one question, and several intermediate objectives you must accomplish in order to answer it. For example, your question might be "Is RNA X a protease?", and to answer it you must first (i) clone the *rnaX* gene, (ii) isolate pure RNA X, and (iii) identify and synthesize appropriate test substrates. Alternatively, your aims might be to answer a series of questions ("Is the protease activity of riboprotein X destroyed by ribonuclease A? Does the RNA component of riboprotein X form a transient bond with the substrate?").

You should state after each question or goal how it will be answered or accomplished. For example: "I will determine whether the RNA moiety participates directly in catalysis by looking for transfer of 3H from the substrate to RNA X."

If the main part of your proposal is only worth doing if the first experiment turns out a particular way, you are asking for trouble. For example, if you propose to first find out whether RNA X is a protease and to then characterize its proteolytic activity on various substrates, you must either have made (in the Background section) a very strong case for why RNA X must be a protease and why we nevertheless need to do the experiment that shows it is one, or go on to

describe the valuable research you will do if RNA X turns out not to be a protease after all. Similarly, it's OK to have a mixture of safe and risky experiments in your proposal, but don't let the major part of the proposal depend on a risky experiment.

Experimental Approach - One to two pages

Here you describe the logic behind your proposed experiments. Introduce each section by stating, in a sentence or less, what you are trying to accomplish, and end it by similarly summarizing what the experiments you've just described will accomplish.

Discuss the controls you will do. How you will know the system is working as expected? Also consider possible pitfalls. What might not work, and how you can get around anticipated problems? If your experiments depend on a new or untried technique, what will you do if it doesn't work on your first try? (Example: Will you need to isolate extremely pure RNA X? How will you assay purity? How sensitive is this assay? What will you do if you can't get the RNA sufficiently pure?) Don't give too many details about equipment or procedures as you can fill in those orally for the committee.

You should also discuss how you will interpret your results. For example: "The presence of two or more distinct bands in the gel will imply that RNA X is a specific protease, whereas the complete absence of bands will suggest it has non-specific proteolytic activity." Such discussion not only shows that you understand what you're going to do, it helps the reviewer to follow your logic.

Data in Progress

You are encouraged to present any "Data in Progress" that you (alone or with the help of co-workers) have obtained as an integral part of your proposed research. This data may be included as either "background material" or within the "experimental approaches", along with appropriate figures.

If it is necessary to include unpublished data from other members of your supervisor's research group, be sure to clearly cite the source.

Significance - One or two paragraphs

Relate the answers you expect to get back to the big question. What new avenues for investigation will your research open up? What will you be able to do once you have achieved your immediate aims?

References

These do not count towards your page limit, but the references section should not be longer than the body of the proposal. Be selective but please give complete citations with titles and full pages.

Figures

You are allowed additional pages for figures. Often, an appropriate figure is worth several pages of text. It is imperative that all figures be clearly reproduced. Legends should be placed on the same page as the figure. They should be kept to the minimal size necessary for a clear explanation.

Style

Take time to ensure that your proposal is free of grammatical and typographical errors. Check the proposal is written in a clear and concise style. Finally make sure your figures are understandable.

Biochemistry and Molecular Biology
Annual Student Report

Date of committee meeting:

Date of last committee meeting:

1) Please complete the following (underline new items within the past year), use as much space as needed:

Courses completed with grades:

Publications (published, in press, submitted, in prep, etc):

Conference presentations:

Awards:

Leadership:

Teaching:

Other relevant accomplishments:

Timeline:

2) Present each committee member with a short (e.g. 3-5 pages) written description of the project and research plan

Guidelines for Thesis Progress Report

Maximum length of 5 pages (11+ pts, single spaced) plus appendix with references, figures and tables

1. Statement of the Research Problem (1 page)

- Provide a brief scientific introduction to the research problem.
- Provide background information that logically leads to one more hypotheses that will be tested.
- Briefly describe the rationale and significance of the work to be undertaken.

2. Research Objectives and Approach (1/2 page)

- State 1-3 specific research objectives in point form.
- Each objective should be a sentence of what you will learn (what data will be acquired).
- Following each objective, provide a short paragraph with the specific approach and expected outcomes.

3. Summary of Results (3 pages)

A. Work accomplished in previous years

- For each specific research aim, summarize the major results.
- If the work is published, give the citation.

B. Work accomplished since last committee meeting

- Organized by specific research aim, describe your most recent work.
- Figures and tables can be attached to the appendix.

4. Summary of Future Work (1/2 page)

- In point form, list the work to be performed in the coming year.

Biochemistry and Molecular Biology
PhD Comprehensive Exam

Form One
Suggested Examination Topics and Examiners

Student's Name: _____ Date: _____

NOTE TO EXAMINERS:

Suggested topics for the Comprehensive Exam should relate broadly to the Candidate's research area, ensuring an adequate background to complete a PhD thesis. These topics may evolve around review articles, a series of papers, the background for a relevant technique, and so forth. Topics will be finalized once the external examiner has been assigned. At that time, examiners will provide more specific directives on the topics to the candidate.

Suggested Examination Topics:

1) _____

2) _____

3) _____

4) _____

5) _____

Suggested Examiners:

1) Dr. _____

2) Dr. _____

3) Dr. _____

4) Dr. _____

Biochemistry and Molecular Biology
PhD Comprehensive Exam

Form Two
Need for Re-evaluation of the Written Proposal

Student's Name: _____ Date: _____

Note to Examination Committee:

Should the examining committee find the revised written proposal still unacceptable, they should report the reasons below and **return this form to the Graduate Secretary**. The Graduate Program Committee will decide what further actions are required at that point.

Examination Committee Member and Reasons for a Re-evaluation:

1. _____
Dr.

2. _____
Dr.

3. _____
Dr.

4. _____
Dr.
Exam Chair

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Comprehensive Exam

Form Three
Approval of the Written Proposal

Student's Name: _____

Date: _____

NOTE TO EXAMINING COMMITTEE:

By signing this sheet, you are giving your full and unqualified approval to the written proposal. If you have any reservations, ask that the document be revised or modified prior to approval. If there is any problem, please let the Chair of the Examination Committee know well in advance.

Please print name under signature line.

Examination Topics:

Dr.

External Examiner

Dr.

Supervisory Committee Member

Dr.

Supervisory Committee Member

Dr.

Examination Chair

